5[65–02, 65C05, 65D30, 65D32, 65V05].—PHILIP J. DAVIS & PHILIP RABINOWITZ, *Methods of Numerical Integration*, 2nd ed., Academic Press, Orlando, Fla., 1984, xiv + 612 pp., 23 cm. Price $52.00.

This book is the third volume on this subject by the same authors. The first was *Numerical Integration*, Blaisdell Publishing Co., Waltham, Mass., 1967 (see Review **43**, *Math. Comp.*, v. 22, 1968, pp. 459–460; *Math. Reviews*, v. 35, 1968, #2482); the second was *Methods of Numerical Integration*, Academic Press, Waltham, Mass., 1975 (see Review **28**, *Math. Comp.*, v. 30, 1976, pp. 666–667; *Math. Reviews*, v. 56, 1978, #7119). This latest version is larger by about 1/3 than the previous. It is an update with an attempt to include some of the many new results that have been published during the interlude since the previous edition, but with more emphasis on applications. Although the organization is very similar to the previous well-organized edition, updates have been made in nearly every section. In addition, references to the many newly published texts and articles have been included.

The authors' previous texts on this subject were very well written, easy to read and understand, requiring only an understanding of calculus and in a few instances a concept of elementary analytic function theory. This is also true of the present version, except that it is more complete.

A glance at the table of contents reveals the following: Chapter 1, *Introduction* (with 16 sections); Chapter 2, *Approximate Integration over a Finite Interval* (with 13 sections); Chapter 3, *Approximate Integration over Infinite Intervals* (with 10 sections); Chapter 4, *Error Analysis* (with 9 sections); Chapter 5, *Approximate Integration in Two or More Dimensions* (with 10 sections); Chapter 6, *Automatic Integration* (with 6 sections); Appendix 1, *On the Practical Evaluation of Integrals* (by Milton Abramowitz); Appendix 2, *Fortran Programs*; Appendix 3, *Bibliography of Algol, Fortran, and PL/I Procedures*; Appendix 4, *Bibliography of Tables*; Appendix 5, *Bibliography of Books and Articles*; and Index.

I recommend this book highly, for both the numerical integration user and researcher.

F. S.

6[35–01, 78A05].—NORMAN BLEISTEIN, *Mathematical Methods for Wave Phenomena*, Computer Science and Applied Mathematics, A Series of Monographs and Textbooks, Werner Rheinboldt, Editor, Academic Press, Orlando, Fla., 1984, 23 cm. Price $55.00.

The present book contains nine chapters with the following headings: First-order partial differential equations; The Dirac delta function, Fourier transforms, and asymptotics; Second-order partial differential equations; The wave equation in one space dimension; The wave equation in two and three dimensions; The Helmholtz equation and other elliptic equations; More on asymptotics; Asymptotics techniques for direct scattering problems; Inverse methods for reflector imaging.

The above list of chapter headings is more revealing about the scope of the book than the title, which may mean different things to different people. Indeed, there is a

great variety of wave phenomena and of mathematical techniques associated with them. For instance, one could mention the topic of nonlinear wave propagation and the notion of shocks: this wave phenomenon is not touched upon in the book. Even in the realm of small amplitude waves, the phenomenon of wave dispersion and the asymptotic methods associated with it are omitted, even though Fourier transforms and asymptotic techniques are discussed. I make these points in order to warn the prospective user about the fact that this book does not contain everything one needs to know about wave phenomena.

The above remarks are in no way meant as a criticism of the book. *Au contraire.* By focusing on those aspects of wave phenomena (propagation of small amplitude, high-frequency waves in inhomogeneous media—refraction, if you will) which the author has had to use in his own research on seismic exploration, he has succeeded in producing an excellent book. In particular, one of its greatest virtues is that it is written in a crystal clear style: there is never any waffling, since the author is never on thin ice. Also, the book contains an unusual mix of topics which are not ordinarily found in any one textbook. (I am thinking of partial differential equations, asymptotics and geometrical optics.) The book has a freshness which is in marked contrast to most elementary textbooks on partial differential equations used for an introduction to these topics. For instance, it has one of the best presentations of the theory of first-order partial differential equations and of ray tracing. Finally, need I add that this book can serve as an ideal introduction to the field of inverse problems of seismic prospecting.

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7[65–01].—T. R. F. NONWEILER, *Computational Mathematics, An Introduction to Numerical Approximation*, Ellis Horwood Series in Mathematics and its Applications, G. M. Bell, Series Editor, Ellis Horwood Limited, Chichester and Halsted Press, Wiley, New York, 1984, 431 pp., 23 cm. Price $59.95.

Was this just one of those mornings when I was being unusually dense? I was gazing steadfastly at the page, which was telling me

> The maximum number of digits available to the mantissa is called the **precision**, or number of **significant digits**. Suppose, for example, a decimal floating-point number is to be represented with 3 significant digits (albeit, not a very generous allocation), then the number $2^{1/2} = 1.414213\ldots$ would be written as 0.141×10^1 if the standardization (1.2.2) is used, or as 1.41×10^0 if (1.2.3) is used.

"Wait! I've taught this material," I reassured myself; "it can't be this abstruse." Had the time come to retire? This same gauze of unknowing seemed to be inserted between me and every paragraph of the book. In desperation, I pulled from the shelf that old warhorse from which I learned (and became enlivened by) the subject,